

REMARKS

The Final Office Action mailed May 12, 2006 has been received and reviewed. In the specification, paragraph [029] has been amended. No new matter has been added.

Claims 1 through 21 are currently pending in the application. Claims 12 through 21 have been allowed. Claims 1 through 8 and 11 stand rejected. Claims 9 and 10 have been objected to as being dependent upon a rejected base claim, but the indication of allowable subject matter in such claims is noted with appreciation. Applicants propose to amend claims 1, 6 and 21, and respectfully request reconsideration of the application as proposed to be amended herein.

35 U.S.C. § 112 Claim Rejections

Claims 6 and 21 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

In an effort to expedite prosecution, applicants have amended claims 6 and 21 to recite “wherein the insulation layer comprises a material selected from the group consisting of oxides, nitrides, carbides, carbon nitrides and oxynitrides.” Reconsideration and withdrawal of the rejection is requested.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 5,355,020 to Lee et al.

Claims 1 through 6 and 11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lee et al., U.S. Patent No. 5,355,020. Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Lee discloses a method of forming a wiring layer comprising providing an insulating layer 32 over a semiconductor substrate 31. A contact hole 33 is included in the insulating layer 32 which exposes a portion of the semiconductor substrate 31. A diffusion barrier layer 34 (Ti or TiN) is deposited over the insulating layer 32 and onto the portion of the semiconductor substrate 31 exposed through the contact hole 33. (*See, e.g., Lee, FIG. 12.*) The diffusion layer 34 may also comprise multiple metal layers. (*Lee, col. 14, line 39-col. 15, line 7.*) Thereafter, a first metal layer 35 and second metal layer 36 are deposited to partially fill the contact hole 33. (*Lee, FIG. 12.*) The first metal layer 35 comprises an aluminum alloy including a silicon component and the second metal layer 36 is aluminum or aluminum alloy. The first and second metal layers are heat-treated to facilitate filling the contact hole 33 above diffusion layer 34. (*Lee, col. 15, lines 30-42.*)

Another metal layer 38 is deposited thereover and heat-treated. “Performing this step enables the atoms of the metal layer to migrate into opening 33, thereby filling it more completely to result in a wholly planarized wiring layer.” (*Lee, col. 16, lines 6-15.*)

By way of contrast with Lee, claim 1 of the presently claimed invention recites a “method for forming a contact electrically connected to a metal line, comprising: forming an insulation layer situated on a semiconductor substrate; forming a contact hole in the insulation layer to expose a contact surface on the semiconductor substrate; and forming a single layer of metal having a substantially planar top surface upon a top planar surface of the insulation layer, the single layer of metal substantially filling the contact hole and in physical contact with the contact surface on the semiconductor substrate.” Support for the amendment can be found throughout the as-filed specification including, for example, FIG. 4, FIG. 6 and related text. Applicants respectfully submit that Lee fails to disclose each and every element of claim 1 of the presently claimed invention.

Specifically, Lee fails to disclose, either expressly or inherently, “forming a single layer of metal having a substantially planar top surface upon a top planar surface of the insulation layer, the single layer of metal substantially filling the contact hole and in contact with the contact surface on the semiconductor substrate.” First, layer 37 of Lee is a composite layer, not a “single layer of metal” as recited in claim 1. (*Lee, col. 15, lines 7-51; FIG. 13.*) Second, the metal layer 37 of Lee clearly is not formed as “a substantially planar top surface upon a top

planar surface of the insulation layer” as recited by claim 1. As seen in FIGs. 12-17, the metal layer 37 is “Y” shaped. Further, that the heat treatment of layer 38 planarizes the surface does not mean that metal layer 37 is also planarized. Metal layer 37 is made by depositing two different layer of metal (aluminum alloy with silicon and aluminum) which only partially fill the contact hole 33. (Lee, FIG. 12.) Heat-treatment causes the two layers to fill the contact hole 33. (Lee, FIG. 13.) By contrast, the second conductive layer 38 is more substantially planar when initially deposited. (Lee, FIG. 14.) Further, conductive layer 38 is formed of metal that lacks silicon. Thus, one of skill the art would not expect layers 37 and 38 to react the same way upon heating. Third, metal layer 37 of Lee is not placed in physical contact with the contact surface on the semiconductor substrate as recited by claim 1. Instead, the metal layer 37 is in contact with diffusion barrier layer 34. (FIG. 12.) As Lee fails to disclose, either expressly or inherently, every element of claim 1 of the presently claimed invention, Lee cannot anticipate claim 1. Thus, claim 1 is allowable.

Claims 2-6 and 11 are each allowable as depending from allowable claim 1.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,355,020 to Lee et al. in view of U.S. Patent No. 5,840,523 to Sahota

Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee et al. (U.S. Patent No. 5,355,020) in view of Sahota (U.S. Patent No. 5,840,523). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The discussion of Lee above is incorporated herein. Sahota fails to cure the deficiencies of Lee. The nonobviousness of independent claim 1 precludes a rejection of claims 7 and 8 which depend therefrom because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to independent claim 1 and claim 7 and 8 which depend therefrom.

Allowable Subject Matter

Claims 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants note with appreciate the indication of allowability and submit that claim 1, from which claim 9 and 10 depend, is also allowable.

Claims 12 through 21 have been allowed.

ENTRY OF AMENDMENTS

The proposed amendments to the claims above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 1 through 21 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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